



MONTANA FISH, WILDLIFE & PARKS

Montana Greater Sage-grouse Population Report

August 18, 2020

Montana Greater Sage-grouse population estimates and associated uncertainty, and the number of known breeding sites (called leks) are presented here in compliance with MCA 87-1-201(1)(11), as amended in 2017.

Montana Fish, Wildlife and Parks (FWP) biologists work with federal agency and non-governmental organization partners and volunteers to count the number of displaying males at lek sites across the state in spring of each year. These data are used to assess population trends for use in sage-grouse management decisions. They are also provided to the Montana Sage-grouse Habitat Conservation Program and the Bureau of Land Management for use in land use decisions and permitting. Counts are conducted at leks 1 – 3 times within a season; however, all leks are not monitored in every year. Each lek is also categorized based on activity status, such as confirmed active or confirmed inactive, according to established definitions (see below). FWP manages the sage-grouse lek count and activity status database for the State of Montana.

Population Estimates - Methods

Montana FWP is working with Dr. Paul Lukacs, University of Montana, to estimate sage-grouse population numbers based on counts of displaying males at leks using *N*-mixture models. This modeling approach is a robust analytical method for estimating population size and trend over time for species like sage-grouse that congregate at discrete breeding sites (McCaffrey et al. 2016). Although FWP maintains a database of male counts at leks that date back to 1952, only data from 2002 onward could be used in this approach.

It is important to recognize these models use algorithms that will estimate similar, but not precisely the same, population numbers each time the models are run. This means that population estimates may vary slightly from previous reports but are well within reported confidence limit bounds.

Population Estimates – Results and Discussion

Montana FWP and partners surveyed 805 leks at least once in spring 2020. The models estimate that there were approximately 77,977 ($\pm 17,979$) sage-grouse in Montana in spring 2020 (Figure 1, Table 1). The increase in population estimates is likely a result of favorable weather conditions in 2019. The lack of widespread drought or extreme weather events (e.g., hail, flooding) during this period may have positively influenced late summer food resources and led to higher survival and recruitment. Data from FWP's sage-grouse research project in central Montana suggests nest success and hen survival were comparatively high in spring and

summer 2019 (Berkeley et al. 2019). If these data are representative of statewide patterns, they could explain the increase in the number of sage-grouse attending leks in spring 2020.

Sage-grouse population numbers oscillate over a period of 8 – 10 years across large scales (Fedy and Doherty 2011). The variation in estimates among years in Montana’s dataset may be due to natural fluctuations. It is important to consider long-term patterns over time and not make management decisions based on one or a few years of lek counts, especially at broad scales.

There are certain assumptions that were used in the development of these estimates, such as an assumed male to female ratio of 1:2.45. The 2018 and 2019 population reports list the main assumptions. There are also other analytical models that have utility for estimating population size and trends, such as Integrated Population Models. However, these models require additional demographic information, such as recruitment data, that are currently unavailable statewide. FWP may explore additional and/or improved modeling techniques in the future as new data become available.

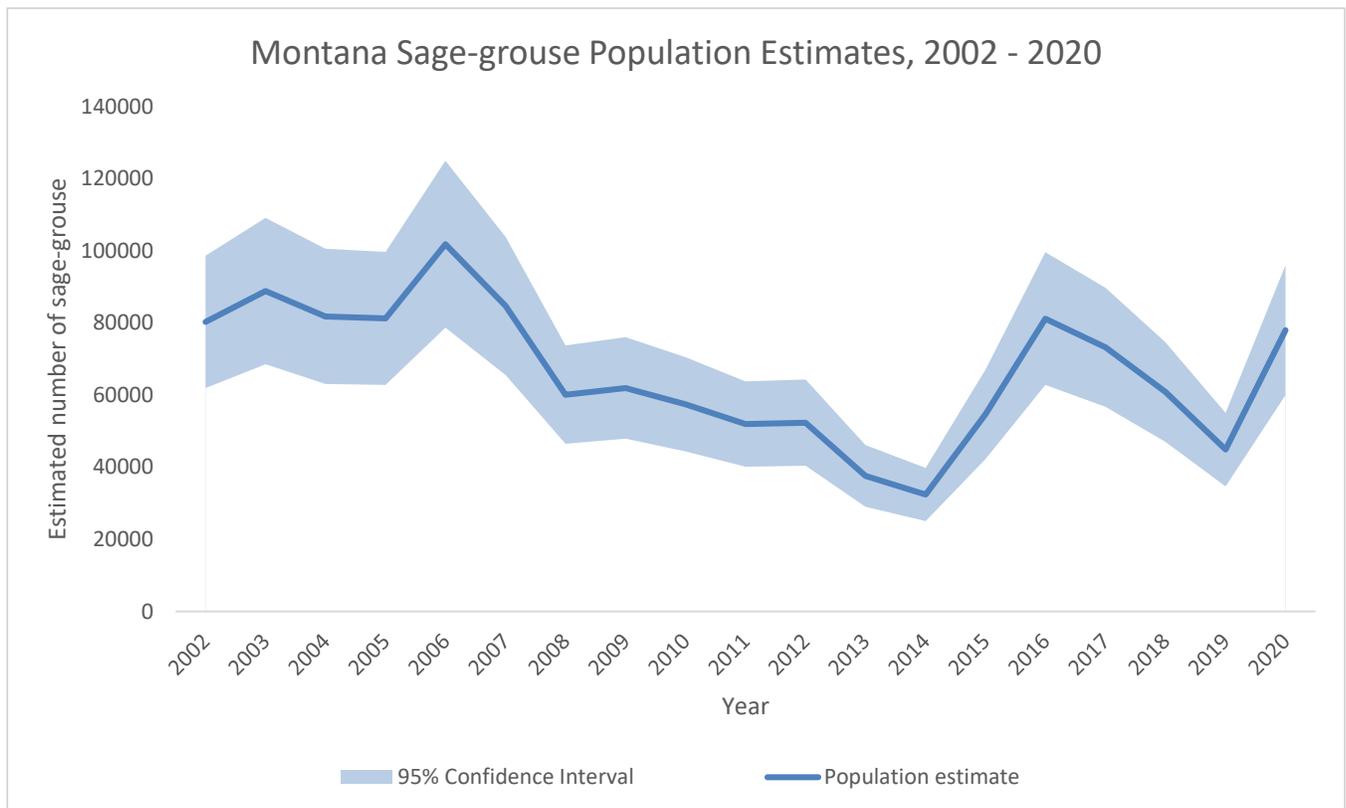


Figure 1. Graphical representation of Greater Sage-grouse population estimates and associated uncertainty from *N*-mixture models in Montana, 2002 – 2020. In general terms, confidence intervals are the range of values that describe the uncertainty around the population estimate.

Table 1. Numerical estimates of Greater Sage-grouse population numbers and associated uncertainty from *N*-mixture models in Montana, 2002-2020.

Year	Population Estimate	Standard Error	Confidence Interval	
			Lower Bound	Upper Bound
2002	80272	9364	61919	98625
2003	88874	10346	68596	109152
2004	81813	9563	63070	100556
2005	81244	9409	62802	99686
2006	101831	11806	78691	124971
2007	84692	9768	65547	103837
2008	60122	6964	46473	73771
2009	61969	7165	47926	76012
2010	57433	6644	44411	70455
2011	51970	6050	40112	63828
2012	52362	6090	40426	64298
2013	37613	4360	29067	46159
2014	32407	3762	25033	39781
2015	54673	6322	42282	67064
2016	81201	9395	62787	99615
2017	73222	8430	56699	89745
2018	60858	7050	47040	74676
2019	44867	5188	34699	55035
2020	77977	9173	59998	95956

Number of Leaks

FWP maintains a spatial database of Greater Sage-grouse leks, summarized by activity status in Table 2. FWP staff are continually working to confirm and record new lek locations and update lek status. In 2018, FWP added a new status category, *Provisionally Active*, to alert the Montana Sage Grouse Habitat Conservation Program, the Bureau of Land Management, and industry proponents of newly discovered leks immediately. Two survey years are required to meet the definition of a Confirmed Active lek; thus, without a Provisionally Active status option, there was a delay of over one year before resource agencies and industry were notified of newly discovered leks. Provisionally Active status is meant to be temporary. If data are not sufficient to meet the definition of Confirmed Active after a second year of surveys, a Provisionally Active lek will revert to Unconfirmed and would not be evaluated under state or federal assessments for new development. If data is sufficient in the second year of surveys, the lek will immediately be classified as Confirmed Active.

Table 2. Number of known Greater Sage-grouse leks in Montana by classification status, 2002 – 2020.*

	Confirmed Active	Confirmed Inactive	Confirmed Extirpated	Provisionally Active	Never Confirmed Active	Unconfirmed	Total
2002	548	79	17	.	29	512	1185
2003	613	84	17	.	47	519	1280
2004	650	88	19	.	56	530	1343
2005	675	94	19	.	64	544	1396
2006	718	96	19	.	67	604	1504
2007	753	98	20	.	72	630	1573
2008	809	100	22	.	75	591	1597
2009	851	104	25	.	92	551	1623
2010	948	110	40	.	119	444	1661
2011	971	125	50	.	150	382	1678
2012	979	133	50	.	180	352	1694
2013	978	144	59	.	200	331	1712
2014	985	154	65	.	227	292	1723
2015	988	172	65	.	242	269	1736
2016	993	185	66	.	255	270	1769
2017	1009	199	66	.	251	280	1805
2018	1012	220	66	(3)	260	255	1813
2019	1019	232	66	(3)	266	249	1832
2020	998	264	66	3	273	237	1841

*FWP’s database is dynamic and the status of a lek can change retroactively based on new information entered at any time. Reviewers may notice small changes in classification numbers from what was reported in previous reports. These are not errors; rather they are the most up-to-date numbers as of this report.

^New status created in 2018. See definition below. Provisionally Active status is only relevant for the current year; leks categorized as Provisionally Active in previous years have been moved to Confirmed Active or Unconfirmed status, as appropriate. The number of leks that meet the Provisionally Active criteria in 2018 and 2019 is noted in parenthesis.

Lek Status Definitions

Confirmed Active - Data supports existence of lek. Supporting data defined as 1 year with 2 or more males lekking on site followed by evidence of lekking (Birds - male, female or unclassified; -OR- Sign - vegetation trampling, feathers, or droppings) within 10 years of that observation.

Confirmed Inactive - A Confirmed Active lek with no evidence of lekking (Birds - male, female or unclassified; -OR- Sign - vegetation trampling, feathers, or droppings) for the last 10 years. Requires a minimum of 3 survey years with no evidence of lekking during a 10 year period. Reinstating Confirmed Active status requires meeting the supporting data requirements.

Confirmed Extirpated - Habitat changes have caused birds to permanently abandon a lek (e.g., plowing, urban development, overhead power line) as determined by the biologists monitoring the lek.

Never confirmed active – An Unconfirmed lek that was never confirmed active. Requires 3 or more survey years with no evidence of lekking (Birds - male, female or unclassified; -OR- Sign - vegetation trampling, feathers, or droppings) over any period of time.

Provisionally Active – Preliminary data supports existence of an active lek. This status can only apply during the first year of detection. Supporting data defined as 1 observation with 2 or more males lekking on site AND sign of lekking (vegetation trampling, feather, or droppings) or followed by a 2nd observation of 2 or more males lekking within the same survey year.

Unconfirmed - Possible lek. Grouse activity documented. Data insufficient to classify as Confirmed Active status.

References

- Berkeley, L., M. Szczypinski, J. Helm, and V. Dreitz. 2019. The impacts of grazing on greater sage-grouse habitat and population dynamics in central Montana, FY2019 Annual Progress Report. Montana Fish, Wildlife and Parks, Helena.
- Fedy, B.C. and K.E. Doherty. 2010. Population cycles are highly correlated over long time series and large spatial scales in two unrelated species: greater sage-grouse and cottontail rabbits. *Oecologia*; DOI 10.1007/s00442-010-1768-0.
- McCaffrey, R., J.J. Nowak, and P.M. Lukacs. 2016. Improved analysis of lek count data using N-Mixture models. *Journal of Wildlife Management*; DOI: 10.1002/jwmg.21094.
- Taylor, R.L., B.L. Walker, D.E. Naugle, and L.S. Mills. 2011. Managing multiple vital rates to maximize Greater Sage-grouse population growth. *Journal of Wildlife Management*; DOI: 10.1002/jwmg.267